

## Discussion of “The Shrinkage-Delinkage Trade-off”

Variational inference (VI) finds  $q^* := \operatorname{argmin}_{q \in \mathcal{Q}} \operatorname{KL}(q||p)$  for an unknown target  $p$ .

What should  $\mathcal{Q}$  be?

## Discussion of “The Shrinkage-Delinkage Trade-off”

Variational inference (VI) finds  $q^* := \operatorname{argmin}_{q \in \mathcal{Q}} \operatorname{KL}(q||p)$  for an unknown target  $p$ .

What should  $\mathcal{Q}$  be?

Classical VI takes a simple  $\mathcal{Q}$ . Then  $p \notin \mathcal{Q}$ , but you get computational benefits!

## Discussion of “The Shrinkage-Delinkage Trade-off”

Variational inference (VI) finds  $q^* := \operatorname{argmin}_{q \in \mathcal{Q}} \operatorname{KL}(q||p)$  for an unknown target  $p$ .

What should  $\mathcal{Q}$  be?

Classical VI takes a simple  $\mathcal{Q}$ . Then  $p \notin \mathcal{Q}$ , but you get computational benefits!

But when  $p \notin \mathcal{Q}$ , can get poor posterior approximations even in simple cases.

What to do?

# Discussion of “The Shrinkage-Delinkage Trade-off”

Variational inference (VI) finds  $q^* := \operatorname{argmin}_{q \in \mathcal{Q}} \operatorname{KL}(q||p)$  for an unknown target  $p$ .

What should  $\mathcal{Q}$  be?

Classical VI takes a simple  $\mathcal{Q}$ . Then  $p \notin \mathcal{Q}$ , but you get computational benefits!

But when  $p \notin \mathcal{Q}$ , can get poor posterior approximations even in simple cases.

What to do?

1. Don't care (“machine learning”)
  - Evaluate by other criteria than posterior approximations (e.g. prediction)
  - Maybe fine for some machine learning tasks

# Discussion of “The Shrinkage-Delinkage Trade-off”

Variational inference (VI) finds  $q^* := \operatorname{argmin}_{q \in \mathcal{Q}} \operatorname{KL}(q||p)$  for an unknown target  $p$ .

What should  $\mathcal{Q}$  be?

Classical VI takes a simple  $\mathcal{Q}$ . Then  $p \notin \mathcal{Q}$ , but you get computational benefits!

But when  $p \notin \mathcal{Q}$ , can get poor posterior approximations even in simple cases.

What to do?

1. Don't care (“machine learning”)
  - Evaluate by other criteria than posterior approximations (e.g. prediction)
  - Maybe fine for some machine learning tasks
2. Make  $\mathcal{Q}$  more expressive (“modern VI”)
  - Strong theoretical guarantees
  - High computational cost!

# Discussion of “The Shrinkage-Delinkage Trade-off”

Variational inference (VI) finds  $q^* := \operatorname{argmin}_{q \in \mathcal{Q}} \operatorname{KL}(q||p)$  for an unknown target  $p$ .

What should  $\mathcal{Q}$  be?

Classical VI takes a simple  $\mathcal{Q}$ . Then  $p \notin \mathcal{Q}$ , but you get computational benefits!

But when  $p \notin \mathcal{Q}$ , can get poor posterior approximations even in simple cases.

What to do?

1. Don't care (“machine learning”)
  - Evaluate by other criteria than posterior approximations (e.g. prediction)
  - Maybe fine for some machine learning tasks
2. Make  $\mathcal{Q}$  more expressive (“modern VI”)
  - Strong theoretical guarantees
  - High computational cost!
3. Try to capture important properties of  $p$  with simple  $\mathcal{Q}$ 
  - Begins with understanding how things go wrong (**this paper!**)
  - Hope to have our cake and eat it too (e.g. marginals *and* easy computation)
  - Much harder! But important, with big potential benefits

I would love to see more work like this!